



FIRE LINES

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Climate, Weather, and Large Fires: Some Interesting Connections

What are the critical conditions that lead to the very large fires that represent a small percentage of the number of wildfires, yet account for the majority of burned area? The intuitive answer is commonly hot, dry, windy weather. But are there other contributing factors and implications for fire management and ecological restoration? A rich history of research has addressed interactions among climate, weather, and fires, forming the scientific basis for our understanding of fire behavior, effects, management, and planning. Yet, insights continue to emerge from new studies. Two recent examples addressed how multiple factors and scales explain the occurrence of very large fires across the eastern United States (Barbero et al., 2014) and how analysis of multiple fire weather parameters in South Florida illustrates a short, but definitive, 'fire season' in which historical large fires most likely occurred (Platt et al., 2015).

Starting with a 1984 to 2010 dataset for 3607 large fires (>500 ac) and 231 very large fires (>7500 ac) across the eastern U.S., Barbero and colleagues evaluated climate and weather factors at three different time scales:

- 1) the Palmer drought severity index over 16 months preceding each fire start as a measure of long term drought,
- 2) the Energy Release Component from the National Fire Danger Rating System 30 days before and after fire start dates as a measure of within season fuel moisture deficit accumulation and heat release, and
- 3) the Fosberg fire weather index to capture short-term weather impacts on fire potential 5 days before and 10 days after each fire start.

The authors concluded that very large fires in the eastern US generally occur during long-term drought, immediately following the annual low point in precipitation when fuels are driest and most available, and when fire weather conditions are significant with high temperatures, winds, and low humidity. The conclusion may be obvious to fire managers, but it clearly demonstrates the value in forecasting potential large wildfire occurrence by using climate and weather factors at multiple time scales. Such forecasts should also enhance fire suppression and mitigation planning.

The second study centered on Avon Park Air Force Range in south-central Florida and a detailed record of 171 wildfires and 664 prescribed fires from 1997 through 2009. Models that related wildfire size to air temperature, relative humidity, solar radiation, soil moisture, and fire start date were derived to evaluate the 'seasonality' of all fires, including occurrences of large fires. Conventionally, two seasons are generally defined on the basis of precipitation or temperature, but the analysis demonstrated a third 'fire season' in which large wildfires occur between the end of the dormant season and the onset of the wet summer season. During this fire season, conditions annually were favorable for fire spread across landscapes, and under some weather conditions for the occurrence of large fires. At Avon Park, although prescribed fire and wildfires can burn in all seasons, 90% of the area burned by lightning-ignited wildfires occurred in this three-month window (typically early April to late June, with annual variation depending on general weather patterns). The authors suggest that, historically, large landscape level fires occurred during this short, hot, dry period in late spring, ignited by lightning from the first summer season thunderstorms, while water levels and fuel moisture were at their lowest. If most natural wildfires in these subtropical grasslands and savannas burned in this 'fire season,' then it is reasonable that it is also the optimum time for prescribed burning for objectives focused on mimicking natural fire and restoring ecological effects of those fires. In contrast to the pattern for lightning fires, prescribed fires in the study generally occurred outside the 'fire season,' suggesting that timing of prescribed fires at Avon Park have tended not to mimic natural fires. This study suggests that more attention should be paid to the natural 'fire season' in conducting prescribed fires.



A prescribed fire at Avon Park Air Force Range (US Air Force photo).

Citations:

- Barbero et al., 2014, *Multi-scalar influence of weather and climate on very large-fires in the Eastern United States*, International Journal of Climatology, <http://onlinelibrary.wiley.com/doi/10.1002/joc.4090/full>
- Platt et al., 2015, *Seasonality of fire weather strongly influences fire regimes in South Florida savanna-grassland landscapes*, PLOS ONE Journal <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0116952#abstract0>

Regional Fire Potential Forecast

With this issue's focus on forecasting fire weather and fire potential, we'd like to share the current regional forecast for the South from the National Interagency Fire Center, Predictive Services. More detailed regional forecasts, along with many other resources, are available on the [Southern Area Coordination Center website](#). Keep yourself informed.

"Above normal significant wildland fire potential will develop in June along the Mid-Atlantic coast, expanding inland through Georgia and South Carolina in July. Conditions remain very wet for the western half of the geographic area. In contrast, the dryness that developed over the Atlantic states since early spring with precipitation deficits is having a detrimental effect on fuels. Continued drying is expected in that area, periodic and below normal precipitation expected to persist."

(www.predictiveservices.nifc.gov/outlooks/monthly_seasonal_outlook.pdf)

Fire and Weather: Resources for Managers

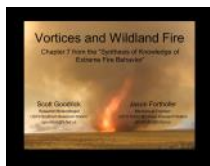
As understanding weather conditions and forecasts is imperative for both using prescribed fire and suppressing wildfire, we often hear from managers that they would like more information on all aspects of fire weather. Below is a collection of recent webinars that you can view at your convenience and publications that provide instructions for determining weather forecasts and anticipating smoke and fog issues.

Archived Webinars



NWS Fire Weather Resources for the South

This one-hour webinar by Angie Enyedi, Lead Forecaster with the Jacksonville, Florida office of the National Weather Service (NWS) explored numerous fire weather forecast products and tools developed by the NWS in Florida. Angie specifically discussed topics related to spot weather forecasts, meteograms, and dispersion indices.



Vortices and Wildland Fire

Scott Goodrick, a research meteorologist with the USDA Forest Service, and Jason Forthofer, a mechanical engineer with the USDA Forest Service, provide a summary of vortices and wildland fire, and discuss mechanisms of formation and growth and how this information can be used by firefighters.



Critical Fire Weather Patterns – Eastern US, Canada and Australia

In this webinar, Paul Werth, a fire weather meteorologist with Weather Research and Consulting Services, LLC, discusses weather elements that promote extreme fire behavior, critical fire weather patterns, and forecast products that are useful in determining risk.

Fact Sheets and Other Publications

Detailed Point Weather Forecasts: This 2-page fact sheet explains the short, easy steps for accessing 48-hour detailed forecasts through local NWS websites or the NOAA Fire Weather website.

Situational Awareness: Nighttime Smoke and Fog on Prescribed Burns: Review a list of weather, fuel, and other factors that may lead to smoke dispersion problems, potentially creating nighttime smoke and fog.

Superfog: State of the Science: This fact sheet summarizes presentations from the 2013 International Association of Wildland Fire Smoke Symposium to familiarize managers with the tools and information they can use to prepare for and determine the likelihood of superfog events.

Weather and Fuel Considerations: This section of the Introduction to Prescribed Fire in Southern Ecosystems (starting on page 19) provides a detailed summary of important weather elements and guidelines for collecting and using weather information on a burn.

UPCOMING EVENTS

Visit the [SFE Calendar](#) and the [JFSP Calendar](#) to learn more about upcoming events. To add an event to our calendar, send the event information to contactus@southernfireexchange.org.

Webinars

[LANDFIRE Biophysical Setting \(BpS\) Review](#)
June 16, 1pm Eastern

PFC Meetings

[North Carolina Annual PFC Meeting](#)
August 11-12, 2015
Albemarle, NC

[Alabama Annual PFC Meeting](#)
September 3, 2015
Birmingham, AL

[Central Florida PFC Meeting](#)
September 25, 2015
Kissimmee, FL

[Georgia Annual PFC Meeting](#)
September 29, 2015
Tifton, GA

Workshops and Trainings

[Shortleaf Pine in the Appalachians](#)
July 29-30, 2015
Asheville, NC

[Alabama Burn Manager Trainings](#)
Sessions in July, August, and September
Various Locations, AL

[Basic Wildland Firefighter Training](#)
Online: August 3-14, 2015
In-person: August 18-21, 2015
Gainesville, FL

[Prescribed Burn Manager Certification](#)
September 16-17, 2015
Statesboro, GA

Conferences

[3rd Biennial Shortleaf Pine Conference](#)
September 22-24, 2015
Knoxville, TN

[Backyards & Beyond: Wildland Fire Education Conference](#)
October 22-24, 2015
Myrtle Beach, SC

[Society of American Foresters 2015 National Convention](#)
November 3-7, 2015
Baton Rouge, LA

[6th International Association for Fire Ecology Congress](#)
November 16-20, 2015
San Antonio, TX

NEWS AND REMINDERS

NEED TRAINING?

A new post of the [Southeast Prescribed Fire Update](#) website shares detailed steps for how to get the wildland fire training you need for the career or volunteer opportunity you want.

APPLY FOR 2015 AFE CERTIFICATION!

The Association of Fire Ecology is now accepting applications for the 2015 [Wildland Fire Professional Certification](#) and the [Wildland Fire Academic Program Certification](#). Applications are due July 1, 2015.

ARCHIVED PRESENTATIONS

Take a few minutes to explore the new [Florida Scrub Working Groups website](#), which now has workshop and meeting presentations archived by topic. You'll find [several presentations](#) on prescribed fire, habitat restoration, mitigation, and effective communication.

NEW VIDEO SERIES

Check out a new video series, [Living with Texas Fire](#), from the Texas A&M AgriLife Extension Service. The series includes 20 short videos, on topics ranging from interpreting fire weather forecasts and onsite weather to fire effects on wildlife and livestock.

2014 QUADRENNIAL FIRE REVIEW

The [2014 Quadrennial Fire Review](#) contains a "strategic evaluation of the long range direction of wildland fire management." The review complements and informs the Cohesive Strategy and provides a baseline assessment of four issues: Changing Climatic Conditions, Risk Management, Workforce, and Operational Capabilities.

FIRE CENTER WX APP

A new Android app makes it easier to do fire behavior calculations, without having to carry Appendix B of the Fireline Handbook. Lighten your pack and get the calculations right the first time. For more information, [click here](#).

FLORIDA'S STATE WILDLIFE GRANTS

[Florida's Wildlife Legacy Initiative](#) is accepting applications for projects to address the goals of Florida's State Wildlife Action Plan. Applications are due July 13, 2015 by 12:00pm ET. [Click here](#) for the grant announcement, guidelines, and application.



The Southern Fire Exchange is funded through the Joint Fire Science Program, in agreement with the United States Forest Service, Southern Research Station. This institution is an equal opportunity provider.

2015 JFSP Funded Projects

Congratulations to the recipients of the 2015 Joint Fire Science Program research funding! To see a full list of funded projects, [click here](#). We are excited to share the following list of projects that will be taking place in the southern region. Click on the titles to visit the JFSP website and see an overview of the project. We look forward to sharing project results with you!

- ⇒ [US Smoke Hazard Warning System: Prototype and Enhancements to Operational Systems \(US Forest Service, PNW-AirFire Research Team\)](#)
- ⇒ [Mapping Fuels for Regional Smoke Management and Emissions Inventories \(Michigan Technological University\)](#)
- ⇒ [Fire Ember Production from Wildland and Structural Fuels \(University of North Carolina-Charlotte\)](#)
- ⇒ [The Consequences of Soil Heating for Prescribed Fire Use and Fire Restoration in the South \(University of Florida\)](#)
- ⇒ [Fire Modeling and Social Science Analysis of Fire Managers' Use of Fire Weather Data across the US \(Oregon State University\)](#)

Cohesive Strategy: Models for Action

The new website for the [Southern Regional Strategy Committee for the Cohesive Strategy](#) shares information and resources to educate the public about the benefits and risks of wildland fire in the South and provides examples for minimizing those risks. The website is organized by the five foundational values that support the overall strategy for managing wildland fire in the South:

- 1) Firefighter & Public Safety
- 2) Property Protection
- 3) Marketable Products
- 4) Ecological Services
- 5) Cultural Values

Actions and strategies for involvement are given for each foundational value. In addition, several case studies, called Models for Action, have been summarized and connected to the identified actions. These short summaries share examples, successes, and lessons learned from a variety of contexts and locations across the Southeast. A list of partners and contact information for each case is also provided. You can view a full list of the Models for Action at <http://www.southernwildfire.net/models-for-action>.



Video Series: Minimizing Smoke Impacts of Prescribed Fire

A six-part video series, produced by the US Forest Service, [Adaptive Management Services Enterprise Team](#), provides an overview of the USFS Air Resource Management Program. The video series, [Minimizing Smoke Impacts of Prescribed Fire](#), is available on YouTube and contains six separate short videos to introduce the program, how the USFS addresses air quality impacts of smoke and leads in smoke management, why the USFS uses fire as a land management tool, and basic smoke management practices. These videos can provide a brief overview for those unfamiliar with smoke management, or they can provide managers and landowners some key talking points for communicating with new audiences.



FEIS: How to Get the Fire Effects Information You Need

The Fire Effects Information System (FEIS) includes summaries and reviews on life history, general ecology, and fire ecology and effects for over 1,100 plant and animal species. A [new 3-page SFE fact sheet](#) shares instructions and tips for locating information for a particular species and for searching other FEIS reviews, such as fire studies and fire regime syntheses.

